

JK
4149
C65
K75
1992
v.1

KPMG Peat Marwick

Management Consultants

*Quality and experience
for measurable results*

Manufacturing and
Technology Industries

Financial Institutions

Insurance

Real Estate and Hospitality

Health Care

Government Services

Higher Education and
Not for Profit

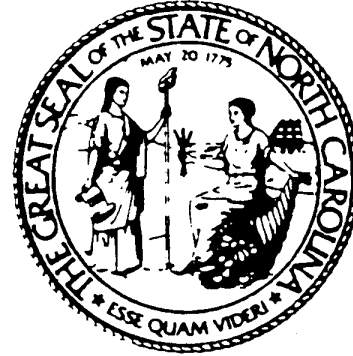
Airports

Retail and Wholesale

Energy

Utilities

Environmental



**NORTH CAROLINA
GENERAL ASSEMBLY
GOVERNMENT PERFORMANCE
AUDIT COMMITTEE**

**PERFORMANCE AUDIT OF
INFORMATION TECHNOLOGY
AND TELECOMMUNICATIONS**

VOLUME I

**Final Report
December 1992**

LEGISLATIVE LIBRARY



Peat Marwick

Management Consultants

2001 M Street, N.W.
Washington, DC 20036

Telephone 202 467 3000
Telex 440477 PMMDCUI

Telefax 202 833 1350

December 18, 1992

The Honorable Daniel T. Blue, Jr.
Speaker of the House

The Honorable Henson P. Barnes
President Pro Tempore

Members, Government Performance Audit Committee

This report presents the results of our performance audit of the State of North Carolina's information technology and telecommunications functions as identified in the table of contents. Our audit was conducted in accordance with *Government Auditing Standards*, issued by the Comptroller General of the United States.

Purpose

Information technology and telecommunications are critical tools that empower State employees to do their work efficiently, effectively, and competitively. Our audit evaluated the performance of statewide information technology and telecommunications functions to determine their ability to meet the State's rapidly growing needs and to recommend changes for improvements in cost-effectiveness and service delivery.

Background

The State appropriated approximately \$97 million in fiscal year 1991 to fund statewide operations of information technology and telecommunications across all three branches of government (excluding the campuses of the University of North Carolina and the Community College System). This funded over 900 information resource management positions and supported operation of 8,000 personal computers, seven mainframe computers, and seven telecommunications networks.

The number of users of information technology has increased more than 50-fold since 1983. The State Information Processing Service (SIPS) has been reviewed eight times since 1986.

OK 4149 .C65 K75 1992 v.1



Member Firm of
Klynveld Peat Marwick Goerdeler

LEGISLATIVE LIBRARY

The Honorable Daniel T. Blue, Jr.
The Honorable Henson P. Barnes
Members, Government Performance Audit Committee
December 18, 1992

2

Results in brief The State's information technology services are not uniformly meeting agencies' needs for technical support and access to information resources. In telecommunications, the State supports multiple networks that are redundant and largely uncoordinated. Inadequate planning at both the state and agency level hampers effectiveness. Individual application systems range from outstanding to dismal. Productivity is severely limited in some agencies as a result of continuing use of outdated technology.

Recommendations The State needs strong coordinated management to take advantage of the benefits and cost effectiveness that information technology offers. It should replace the Information Technology Commission with an Information Resource Management Commission with broader powers, and establish an IRM Advisory Board to link technical plans to programs.

Even with an effective governance structure, the State should develop a technology planning process to integrate budgeting with program planning. Short term steps should be taken to correct unacceptable systems, while plans are made for permanent solutions.

SIPS has already made some changes to become more responsive to its client agencies. Additional action should be taken to incorporate a client marketing function and develop performance measures and staff technical skills.

The State needs to immediately begin statewide planning to consolidate its telecommunications networks. Proceeding with bandwidth on demand should be given a high priority.

Agency response The performance audit addressed 10 agencies in detail; nine have responded. The Employment Security Commission stated that some of the recommendations would not improve its performance. SIPS indicated that some of the findings did not fully reflect its efforts and results, but essentially accepted the recommendations. The remaining agencies cited some disagreements with details of individual findings, but did not disagree with the recommendations.

This report is intended for the information of the Government Performance Audit Committee and the North Carolina Legislature.

KPMG Peat Marwick

The Honorable Daniel T. Blue, Jr.
The Honorable Henson P. Barnes
Members, Government Performance Audit Committee
December 18, 1992

3

The report is a matter of public record and its distribution is not limited.

Very truly yours,

KPMG Peat Marwick

C

**NORTH CAROLINA PERFORMANCE AUDIT
INFORMATION TECHNOLOGY REPORT
VOLUME I**

CONTENTS

	Executive summary	E.1
1	Background, objectives, scope, and methodology	1.1
	Background on enabling legislation	1.2
	Studies on information technology	1.2
	Information technology and telecommunications audit objectives	1.4
	Audit scope	1.4
	Evaluation criteria	1.5
	Methodology	1.6
	Standards	1.9
2	The current situation	2.1
	Potential benefit from information technology	2.3
	Current organization	2.4
3	Major performance audit findings and recommendations	3.1
	Governance of technology	3.1
	Finding 1 - The ITC has not been effective in its oversight of technology	3.1
	Finding 2 - The Employment Security Commission is inadequately represented on the SIPS Advisory Board	3.6
	Finding 3 - IRM reports to an Assistant Secretary in most agencies	3.6
	The governance process	3.7
	Finding 4 - Major appropriation requests for information technology often are not effectively managed	3.8
	Finding 5 - North Carolina is affected adversely by long term technology projects losing funding midstream	3.9
	Finding 6 - Agency spending on information technology often appears to be inadequately managed	3.9

Finding 7 - Consolidated financial information about agency technology efforts and assets is not readily available	3.10
Finding 8 - There is no independent reporting on project status and results	3.11
Finding 9 - State management's discussions about SIPS' finances are often filled with miscommunications that inhibit effective decisions	3.13
Finding 10 - The IRMC has to deal with the issue of agencies going outside of SIPS for data processing	3.14
Technology planning	3.15
Finding 11 - The planning process for technology is ineffective, uncoordinated, and not integrated	3.15
Technology management	3.18
Finding 12 - Current conditions of information technology vary widely among the agencies and some are detrimental to the State	3.19
Finding 13 - Technical experts on agency IRM staffs tend to be underutilized	3.20
Finding 14 - Personal computer (PC) usage among the agencies is at a modest overall level. However, PC cost, distribution, and utilization are not well controlled	3.23
Finding 15 - Agencies often fail to use the competitive process to procure cost-effective solutions to their information technology needs	3.24
Finding 16 - There is a lack of adequate and consistent IRM policies, procedures, and standards among the agencies	3.27
Finding 17 - The agencies do not exercise effective quality assurance (QA) functions	3.29
Finding 18 - SIPS and the IRM divisions in most cases have not provided adequate training and tools to technical staff	3.30
Finding 19 - North Carolina does not have adequate disaster recovery capability for its data centers nor for its mission critical applications	3.32

Finding 20 - Data security measures in effect among the agencies are generally not adequate to provide appropriate protection for sensitive data	3.33
Finding 21 - State personnel policies and appointment practices impact the effectiveness of the IRM divisions	3.35
Telecommunications	3.36
Finding 22 - Management of telecommunications is not well organized across the agencies	3.37
Finding 23 - STS has established closer relationships with its vendors than with its users	3.41
Finding 24 - SIPS' published plans for the State's telecommunications operation and information technology initiatives are insufficient	3.42
Finding 25 - North Carolina's telecommunications needs are poised for rapid growth	3.45
Finding 26 - Several video pilot projects will create additional network costs for the State	3.46
Finding 27 - The State operates multiple telecommunications networks	3.46
Finding 28 - The STS' telecommunications disaster recovery plan is not operational at this time	3.48
State Information Processing Service (SIPS)	3.49
Customer service	3.50
Finding 29 - SIPS' has been seen by its clients operating with a non-responsive and sometimes authoritarian management orientation	3.50
Finding 30 - SIPS does not have an effective client relations function	3.52
Finding 31 - SIPS has been perceived as reluctant to negotiate and implement specific service level agreements	3.54

Finding 32 - SIPS' bills would be more useful if they included information that enabled agencies to manage their associated costs and resources	3.54
Finances	3.56
Finding 33 - SIPS' billing rates have been developed informally	3.56
Finding 34 - SIPS' reserve accumulation will likely impact agencies that obtain federal reimbursements	3.57
Finding 35 - SIPS' reserve requirements are increased by the requirement that it pay current funds for all procurements	3.58
Disaster recovery	3.59
Finding 36 - SIPS current back-up strategy is for each individual agency to be totally responsible for backing up its files	3.59
Performance analysis and capacity management	3.59
Finding 37 - SIPS' work load and capacity planning study to justify and size the IBM ES/9000 computer upgrade lacked the appropriate breadth and depth of analysis	3.59
Finding 38 - The performance analysis and capacity management function at SIPS is not performing all the necessary tasks	3.61
Finding 39 - The capacity management function at SIPS is significantly understaffed	3.61
Finding 40 - SIPS does not have the necessary tools and methodologies to properly perform the capacity management function	3.62
Internal management	3.64
Finding 41 - Problem reporting and Help Desk activities are fragmented	3.64
Finding 42 - SIPS has no internal function responsible to assure high quality user oriented services	3.65
Finding 43 - SIPS is still managing its mainframe as two separate virtual machines instead of as a single image	3.66

Finding 44 - Some production systems at SIPS are not under proper change control	3.66
Finding 45 - SIPS and its user agencies do not use a formal version/release approach for system maintenance	3.67
Finding 46 - SIPS does not provide adequate back-up support among its systems programmers	3.68
Finding 47 - Several title classifications affecting SIPS analysts are out-of-date	3.68
Technical leadership	3.68
Finding 48 - SIPS has always provided IBM mainframe solutions but agencies have also needed help with other platforms and technology	3.68
Finding 49 - SIPS training services are well received, but are needed on more and newer products	3.69
Finding 50 - SIPS takes no responsibility for the efficiency of agency applications run at its data center	3.70
Finding 51 - SIPS has not allocated sufficient resources to provide the type and level of support specified for LANs	3.70
Finding 52 - SIPS' LAN guidelines are too narrow to support agencies' needs	3.71
Finding 53 - SIPS' programmers and analysts do not have adequate training to successfully develop systems using the new methodology and CASE tools	3.72
Finding 54 - SIPS and its user agencies are still manually releasing and controlling most production jobs	3.73
Finding 55 - The data center operated for the departments by the State Computer Center (SCC) has the potential to improve certain aspects of its utilization of resources, based on a comparison with other data centers	3.73

4 Appendix

A	Governance structure components	A.1
B	Sample glossary	B.1
C	SIPS peer group comparison	C.1
D	State controller comments	D.1

LIST OF EXHIBITS

1-1	Participants in performance audit of information technology telecommunications	1.7
2-1	IRM expenditures and personnel by agency	2.2
2-2	State Information Processing Services Division (SIPS)	2.10
2-3	SIPS' budget versus executive branch IRM budget	2.12
2-4	Comparison of IRM budgets to state budgets	2.14
2-5	Distribution of states by number of major data centers	2.16
3-1	Governance structure	3.4
3-2	Relative levels of IRM support by agency expenditures	3.21
3-3	Relative levels of IRM support by agency staffing	3.22
3-4	Ratio of staff to personal computers by agency	3.25
3-5	Recommended organization structure for telecommunications management	3.39
3-6	Recommended assignment of network management responsibilities	3.40

EXECUTIVE SUMMARY

Introduction

The objectives of the Phase I performance audit were to assess the performance of the information technology and telecommunications functions statewide, and to develop recommendations for improvements in cost-effectiveness, productivity, and service delivery levels.

The scope of the information technology audit covered the legislative, judicial, and executive branches, excluding the campuses of the University of North Carolina (UNC) and the Community Colleges. Appropriations for these operations totalled approximately \$97 million in fiscal 1992.

This analysis was performed in conformance with generally accepted practices for an information technology diagnostic review and in compliance with Government Auditing Standards. It included: a preliminary survey of technology operations and management policies and practices; detailed fieldwork in departmental operations of selected State agencies; a technical analysis of the State Computer Center operations; and the preparation of a Phase I report.

Summary of findings and recommendations

The following findings and recommendations summarize the most important points for the State of North Carolina to address regarding the management of its information technology resources.

Finding - North Carolina has not achieved acceptable levels of quality, value, and cost effectiveness in its information technology.

Under the current management structure and legislation:

- The State Information Processing Service (SIPS) has achieved noteworthy accomplishments in providing mainframe computing services and statewide telecommunications services. In this regard, SIPS has effectively served its intended purpose of making advanced technology readily available to all agencies, and it continues to serve that purpose well. At the same time, however, many of SIPS' client agencies have stated that SIPS has not satisfied their needs in terms of adequate service orientation; of capability to provide technical support in certain areas outside the IBM mainframe arena; and providing an acceptable billing rate structure.
- The quality and effectiveness of application systems across the agencies vary from good to totally unacceptable.

- Some major technology investments by agencies have produced results far short of the expectations that were raised.
- The Information Technology Commission (ITC) has often been ignored by agencies undertaking major technology initiatives because they feel that the ITC can only hinder them. Consequently, the ITC has seldom voted on anything other than perfunctory approval of the annual plan, SIPS' policies and billing rates.

Recommendation - Restructure governance over information technology to provide accountability and to assure prudent management.

The State needs both the benefits from technology and the cost effectiveness from strong coordinated management. To achieve these goals, the agencies have to share a positive stake in the effective governance of their combined technology initiatives. The recommended governance structure and process can be built as follows:

- Replace the ITC with an Information Resource Management (IRM) Commission (IRMC) with broader powers.
- Designate the Deputy Controller for IRM as Executive Branch Chief Information Officer (CIO) with responsibility and authority to coordinate IRM across the executive agencies.
- Establish an IRM Advisory Board with representation from each agency to link technology plans to programs.
- Authorize the SIPS Advisory Board, which has representation from each agency, to advise on and approve SIPS' policies, operational practices, service levels, and billing rates.
- Establish an Office of IRM to develop statewide IRM plans and policies and to administer a quality assurance program.

Recommendation - SIPS should become more responsive to its client agencies and establish itself as the State's technology leader.

The reincarnation of SIPS as a client service oriented entity began, albeit gradually, with its internal reorganization in February 1992. The completion of that change will take more time and should include the following steps:

- Incorporate a client marketing function, including a client service management program.
- Develop and report on performance measurements that are meaningful to the clients.

- Restructure billing algorithms and utilization reports to help clients manage their service costs.
- Develop staff technical skill to the depth and breadth necessary to support the needs of the majority of client agencies.
- Ensure that it is competitive in quality and cost with alternative sources of comparable services.

Finding - North Carolina does not perform adequate planning for information technology, either at the agency level or statewide.

North Carolina only began to forge a link between its program planning and agency budgeting processes in 1991. This is an important prerequisite to effective technology planning, which requires linkage with the program plans that are to be supported. However, this second linkage does not yet exist in the State.

At the agency level:

- The agency IRM manager prepares the technology plan, but is not typically included in any part of the program planning process.
- Many large divisions specify individual technology plans that often are not coordinated across other divisions in the agency.
- The technology plans frequently lack sufficient detail to be of value in managing the proposed projects.

At the State level:

- SIPS consolidates the agency technology plans into a single document, but performs only limited review of the individual plans.
- SIPS' own plans are prepared independent of the content of the agency technology plans, and are in too little detail.
- The ITC approves the annual plan, but the approval is perfunctory.

Recommendation - Link technology plans to program objectives on an agencywide basis, and reconstruct the statewide planning process.

The value of planning is more in the process than in the document that is produced. Even with an effective governance structure in place, North Carolina will still need an effective

technology planning process as a foundation for achieving its goals. The planning process should include the following requirements:

- Each technology plan should be specified in a standard comprehensive structure.
- Agency IRM managers should participate in program planning activities as a basis for developing the technology plans.
- Each agency should assign a deputy secretary or division head to the IRM Advisory Board.
- SIPS should focus its annual plan on supporting agency programs and submit it to the SIPS Advisory Board and the IRM Office for review.
- IRMC should be responsible for resolving planning problems and approving the final technology plans for each agency and SIPS, or document its reasons for non-approval.
- The General Assembly should support the IRMC by not considering appropriation requests for technology that lack IRMC review of the supporting plan.

Finding - Some agencies have high risk of mission critical system failures and low productivity in the IRM function.

Substantial disparity exists among the agencies regarding the level, quality, and effectiveness of IRM support. At Departments of Revenue, State Transportation, and Correction, and Office of the State Controller with respect to its Departmental Accounting System (DAS), the information technology systems are in unacceptable condition because:

- They pose a relatively high risk of critical system failures--the kinds of problems that make headlines in the newspapers.
- They hamper IRM staff productivity, effectively raising the agency's cost of operating and maintaining the systems.
- They are correctable, at varying costs, to a reasonable point of technical acceptability.

These unacceptable conditions at various agencies include:

- Computer equipment is already so old that it is scheduled to be taken off the manufacturer's support program.
- Applications are written in old programming languages for which experienced technical staff are not available and cannot be hired. Only the few active employees who are close to retirement know how to make changes to the systems.

- The processing of the systems is inefficient, error prone, dependent upon manual intervention, and costly to operate.

This situation has evolved from years of past management inattention. Therefore, it is not attributable to present management; but only present management can take the necessary corrective actions.

Recommendation - Take short term steps to temper the greatest risks and productivity drains, and plan longer term permanent solutions.

The State Controller is implementing a new system. Revenue and State Transportation have similar plans. Correction recognizes its problem. Some long term steps are underway, but these agencies should also look for short-term steps to lessen critical risks.

Recommendation - Institutionalize prudent management practices for information technology throughout the agency IRM groups.

A Total Quality Management (TQM) program should be used to bring all agencies up to a satisfactory level of management quality. The following steps should be taken immediately:

- Implement a quality assurance program across all agencies
- Invest in current tools and products to leverage the IRM staff
- Invest in training the IRM staff in new technology and methods
- Adopt a minimum set of technology standards
- Replace sole-source procurement with competitive bidding
- Raise data security practices to a standard minimum level
- Raise disaster recovery practices to a standard minimum level
- Update the minimum qualifications for IRM management and staff positions to reflect current requirements
- Provide periodic briefings to agency management on information technology to help them deal with the salient management issues.

Finding - The State operates multiple telecommunication networks and faces rapid growth in demand.

North Carolina pays for three physically separate networks operated by SIPS, UNC, and the Administrative Office of the Courts (AOC). The Departments of Justice, State Transportation, and Public Instruction and the Microelectronics Center of North Carolina also run independent network management functions. The SIPS network alone costs over \$15 million annually to operate. The multiple networks together appear to cost the State at least \$20 to \$30 million annually, and demand is increasing.

SIPS estimates that at least 80 percent of current network traffic is voice, and the rest is data. Rapid growth in demand for video transmission will be driven by Distance Learning, other video teleconferencing, geographic information systems, and imaging applications. Video is likely to account for 50 percent or more of network utilization in the future. The State needs to plan now for increasing network capacity and managing costs.

Recommendation - Consolidate the networks and proceed with the current plan for band-width on demand.

North Carolina should immediately undertake a statewide planning process to determine the most advantageous consolidation approach for achieving service improvements, management efficiencies, and cost-effectiveness, which could reduce direct network costs by as much as 20 percent.

The State should also give high priority to proceeding with band-width on demand, which is a flexible approach to increasing network capacity while limiting cost to only the actual network utilization. It should also carefully manage its term contracts for the current network to minimize termination costs as the new network evolves.